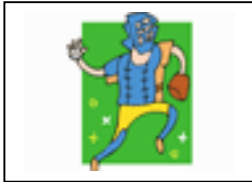


Activity #13: Math (Teacher version)

Comparing Reaction Times in Three Sports

Note to students: Lab teams of two or three students are required for this activity.



softball



baseball



tennis

National Standards addressed:

Content Standards:

Algebra Expectation: Students will draw reasonable conclusions about a situation being modeled.

Geometry Expectations: Students will analyze properties and determine attributes of two- and three- dimensional objects; students will draw and construct representations of two- and three- dimensional geometric objects using a variety of tools.

Measurement Expectations: Students will make decisions about units and scales that are appropriate for problem situations involving measurement; students will analyze precision, accuracy, and approximate error in measurement situations; students will understand and use formulas for the are, surface area, and volume of geometric figures.

Process Standards:

Communication Expectations: Students will organize and consolidate their mathematical thinking through communication; students will communicate their mathematical thinking coherently and clearly to peers, teachers, and others.

Connection Standard Expectation: Students will understand how mathematical ideas interconnect and build on one another to produce a coherent whole.

Purpose:

- To compute speed in meaningful way by applying rules of ratios
- To compare reaction times in three different sports
- To develop an understanding of the need for math in real-world activities
- To practice with the properties of ratio

Materials: calculator

This activity is an adaptation and extension from the Mathematics Teacher, March 2002.

Activity Procedure:

1. Investigate the speed of a softball pitch. In the Olympics, a typical pitch can be thrown at 65 mph. Show all work.

a. First, find how fast a softball thrown at that speed will cross home plate in feet per second.

b. Determine how long it will take for the softball to reach home plate, if home plate is 40 feet from the pitcher's mound.

(The softball travels at $\frac{95 \frac{1}{3} \text{ feet}}{1 \text{ second}}$. It will reach home plate in about .420 seconds.)

2. Investigate the speed of a baseball pitch. In the Olympics, a typical pitch can be thrown at 90 mph. Show all work.

a. First, find how fast a baseball thrown at that speed will cross home plate in feet per second.

b. Determine how long it will take for the baseball to reach home plate, if home plate is 60.5 feet from the pitcher's mound.

(The baseball travels at $\frac{132 \text{ feet}}{1 \text{ second}}$. It will reach home plate in about .458 seconds.)

3. Investigate the speed of a tennis ball. In pro tennis, a typical serve can be traveling 105 mph. Show all work.

a. First, find how fast the tennis ball is served in feet per second.

b. Determine how long it will take for the tennis ball to reach the opposite baseline, if the baselines are 78 feet apart.

(The tennis ball travels at $\frac{154 \text{ feet}}{1 \text{ second}}$. It will reach the opposite baseline in about .506 seconds.)

Analysis:

1. Compare answers. Decide which player must react more quickly to the ball and explain why. _____

2. Did you expect this result? Why or why not? _____

Extension:

What sport do you play? Do a similar analysis on that sport, if possible.

The following web sites and articles provide enrichment and support for this activity:

- 1. *Mathematics Teacher*, March 2002.**
- 2. http://www.riverdeep.net/current/2001/03/031201_mit.jhtml**
- 3. http://wings.avkids.com/Curriculums/Tennis/ballspeed_howto.html**
- 4. http://www.newsearching.com/baseball/9_Speed_Sensor_Baseball_from_Markwort.html**
- 5. Activity #8, World's Largest Math Event 8, April 26, 2002, copyright ©2002 by the National Council of Teachers of Mathematics.**